CLAIMS

What is claimed is:

1. A plasma generator comprising:

a substrate having a first surface and a second surface;

a high Q stripline resonant ring disposed on the first surface of the substrate, the stripline ring having a perimeter of $\lambda/2$ at an operating frequency, and having a discharge gap;

the stripline resonant ring having an impedance matched to that of a power source which provides microwave power to the ring;

a ground plane disposed on the second surface of the substrate;

a connector for connection to a power source for applying microwave power to the stripline ring; and

an enclosure attached to the first surface of the substrate at least over the region containing the discharge gap for containing a gas in the region of the gap.

2. The plasma generator of claim 1 wherein the resonant ring is circular.

3. The plasma generator of claim 1 wherein the resonant ring is non-circular.

4. The plasma generator of claim 1 including a $\lambda/4$ transmission line between the connector and the ring.

5. The plasma generator of claim 1 wherein the substrate is a planar substrate having a high dielectric constant.

6. The plasma generator of claim 1 wherein the connector and the gap are disposed in positions on the resonant ring to provide an intended impedance matched to that of the power source.

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TEL. (617) 542-2290
FAX. (617) 451-0313

7. The plasma generator of claim 1 wherein the gap has a length of 500μm.

8. The plasma generator of claim 1 wherein the gap has a length of 50μm.

9. The plasma generator of claim 1 wherein the gap has a length in a range of about 1μm to about 2mm.

10. The plasma generator of claim 1 wherein the enclosure is a tube coupled to a gas source.

11. The plasma generator of claim 10 wherein the gas source provides argon to the tube.

12. The plasma generator of claim 10 wherein the gas source provides air to the tube.

13. The plasma generator of claim 1 wherein the discharge gap is in the plane of the resonant ring.

14. The plasma generator of claim 1 wherein the discharge gap extends through the substrate.

15. The plasma generator of claim 1 including a bias coil having one end coupled to the resonant ring and the other end having a connector for application of a bias voltage.

16. The plasma generator of claim 1 wherein the enclosure has a gas sealed therein.

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17. A plasma generator comprising:

a substrate having a first surface and a second surface;

a high Q stripline resonant ring disposed on the first surface of the substrate, the stripline ring having a perimeter of $\lambda/2$ at an operating frequency, and having a discharge gap;

the stripline resonant ring having an impedance matched to that of a power source which provides microwave power to the ring;

a ground plane disposed on the second surface of the substrate; and

a connector for connection to a power source for applying microwave power to the stripline ring.

18. The plasma generator of claim 17 wherein the resonant ring is circular.

19. The plasma generator of claim 17 wherein the resonant ring is non-circular.

20. The plasma generator of claim 17 wherein the power source is on the substrate.

21. The plasma generator of claim 17 wherein the resonant ring is of crescent shape near the discharge gap.

22. The plasma generator of claims 17 wherein the resonant ring has a stripline width which decreases toward the discharge gap.

23. A plasma generator comprising:

a substrate having a first surface and a second surface;

a high Q stripline resonant ring disposed on the first surface of the substrate, the stripline ring having a perimeter of $\lambda/2$ at an operating frequency, and having a discharge gap;

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the stripline resonant ring having an impedance matched to that of a power source which provides microwave power to the ring;

a ground plane disposed on the second surface of the substrate; and

a power source on the substrate coupled to the resonant ring.

24. The plasma generator of claim 23 wherein the power source is an integrated circuit power amplifier

25. The plasma generator of claim 24 including a feedback path between the resonant ring and an input of the power amplifier to provide oscillation and frequency control of the power amplifier.

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WEINGARTEN, SCHURGIN,
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FAX. (617) 451-0313